

What is claimed is:

1. A power supply for an implantable cardioverter-defibrillator for subcutaneous positioning between the third rib and the twelfth rib and using a lead system that does not directly contact a patient's heart or reside in the intrathorasic blood vessels and for providing anti-bradycardia pacing energy to the heart, the power supply comprising:

a capacitor subsystem for storing the anti-bradycardia pacing energy for delivery to the patient's heart; and

a battery subsystem electrically coupled to the capacitor subsystem for providing the anti-bradycardia pacing energy to the capacitor subsystem.

2. The power supply of claim 1, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 500 volts.

3. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 25 volts.

4. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 25 volts to approximately 50 volts.

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5. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 50 volts to approximately 75 volts.

6. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 75 volts to approximately 100 volts.

7. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 100 volts to approximately 150 volts.

8. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 150 volts to approximately 200 volts.

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9. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 200 volts to approximately 250 volts.

10. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 250 volts to approximately 300 volts.

11. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 300 volts to approximately 350 volts.

12. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 350 volts to approximately 400 volts.

13. The power supply of claim 2, wherein the anti-bradycardia pacing energy comprises a biphasic waveform

having a peak voltage that is approximately 400 volts to  
approximately 450 volts.

5 14. The power supply of claim 2, wherein the anti-  
bradycardia pacing energy comprises a biphasic waveform  
having a peak voltage that is approximately 450 volts to  
approximately 500 volts.

10 15. The power supply of claim 1, wherein the anti-  
bradycardia pacing energy comprises a biphasic waveform  
having a pulse width that is approximately 2 milliseconds  
to approximately 40 milliseconds.

15 16. The power supply of claim 15, wherein the anti-  
bradycardia pacing energy comprises a biphasic waveform  
having a pulse width that is approximately 2 milliseconds  
to approximately 10 milliseconds.

20 17. The power supply of claim 15, wherein the anti-  
bradycardia pacing energy comprises a biphasic waveform  
having a pulse width that is approximately 10 milliseconds  
to approximately 20 milliseconds.

18. The power supply of claim 15, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 20 milliseconds to approximately 30 milliseconds.

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19. The power supply of claim 15, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 30 milliseconds to approximately 40 milliseconds.

20. The power supply of claim 1, wherein the anti-bradycardia pacing energy comprises a biphasic waveform further comprising a positive voltage portion and a negative voltage portion.

21. The power supply of claim 18, wherein the positive voltage portion further comprises a tilt of approximately 10% to approximately 90%.

22. The power supply of claim 19, wherein the tilt is approximately 50%.

23. The power supply of claim 18, wherein the negative voltage portion further comprises a tilt of approximately 10% to approximately 90%.

24. The power supply of claim 21, wherein the tilt is approximately 50%.

25. The power supply of claim 1, wherein the anti-bradycardia pacing energy comprises a biphasic waveform that is provided at a rate of approximately 40 to approximately 120 stimuli/minute.

26. The power supply of claim 25, wherein the biphasic waveform is provided after a patient's heart rate is equal or less than approximately 20 beats/minute.

27. A voltage output system for an implantable  
cardioverter-defibrillator for subcutaneous positioning  
between the third rib and the twelfth rib and using a lead  
system that does not directly contact a patient's heart or  
reside in the intrathorasic blood vessels and for providing  
anti-bradycardia pacing energy to the heart, the power  
supply comprising:

an energy storage system for storing the anti-  
bradycardia pacing energy for delivery to the patient's  
heart; and

an energy source system electrically coupled to the  
capacitor subsystem for providing the anti-bradycardia  
pacing energy to the capacitor subsystem.

28. The voltage output system of claim 27, wherein  
the anti-bradycardia pacing energy comprises a biphasic  
waveform having a peak voltage that is approximately 5  
volts to approximately 500 volts.

29. The voltage output system of claim 28, wherein  
the anti-bradycardia pacing energy comprises a biphasic  
waveform having a peak voltage that is approximately 5  
volts to approximately 25 volts.

30. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 25 volts to approximately 50 volts.

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31. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 50 volts to approximately 75 volts.

32. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 75 volts to approximately 100 volts.

33. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 100 volts to approximately 150 volts.

34. The voltage output system of claim 28, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 150 volts to approximately 200 volts.

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35. The voltage output system of claim 28, wherein  
the anti-bradycardia pacing energy comprises a biphasic  
waveform having a peak voltage that is approximately 200  
volts to approximately 250 volts.

36. The voltage output system of claim 28, wherein  
the anti-bradycardia pacing energy comprises a biphasic  
waveform having a peak voltage that is approximately 250  
volts to approximately 300 volts.

37. The voltage output system of claim 28, wherein  
the anti-bradycardia pacing energy comprises a biphasic  
waveform having a peak voltage that is approximately 300  
volts to approximately 350 volts.

38. The voltage output system of claim 28, wherein  
the anti-bradycardia pacing energy comprises a biphasic  
waveform having a peak voltage that is approximately 350  
volts to approximately 400 volts.

39. The voltage output system of claim 28, wherein  
the anti-bradycardia pacing energy comprises a biphasic

waveform having a peak voltage that is approximately 400  
volts to approximately 450 volts.

40. The voltage output system of claim 28, wherein  
the anti-bradycardia pacing energy comprises a biphasic  
waveform having a peak voltage that is approximately 450  
volts to approximately 500 volts.

41. The voltage output system of claim 27, wherein  
the anti-bradycardia pacing energy comprises a biphasic  
waveform having a pulse width that is approximately 2  
milliseconds to approximately 40 milliseconds.

42. The voltage output system of claim 41, wherein  
the anti-bradycardia pacing energy comprises a biphasic  
waveform having a pulse width that is approximately 2  
milliseconds to approximately 10 milliseconds.

43. The voltage output system of claim 41, wherein  
the anti-bradycardia pacing energy comprises a biphasic  
waveform having a pulse width that is approximately 10  
milliseconds to approximately 20 milliseconds.

44. The voltage output system of claim 41, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 20 milliseconds to approximately 30 milliseconds.

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45. The voltage output system of claim 41, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 30 milliseconds to approximately 40 milliseconds.

46. The voltage output system of claim 27, wherein the anti-bradycardia pacing energy comprises a biphasic waveform further comprising a positive voltage portion and a negative voltage portion.

47. The voltage output system of claim 46, wherein the positive voltage portion further comprises a tilt of approximately 10% to approximately 90%.

48. The voltage output system of claim 47, wherein the tilt is approximately 50%.

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49. The voltage output system of claim 46, wherein the negative voltage portion further comprises a tilt of approximately 10% to approximately 90%.

5 50. The voltage output system of claim 49, wherein the tilt is approximately 50%.

10 51. The voltage output system of claim 27, wherein the anti-bradycardia pacing energy comprises a biphasic waveform that is provided at a rate of approximately 40 to approximately 120 stimuli/minute.

15 52. The voltage output system of claim 51, wherein the biphasic waveform is provided after a patient's heart rate is equal or less than approximately 20 beats/minute.

20 53. An implantable cardioverter-defibrillator for subcutaneous positioning between the third rib and the twelfth rib within a patient, the implantable cardioverter-defibrillator comprising:

a housing having an electrically conductive surface on an outer surface of the housing;

a lead assembly electrically coupled to the housing and having an electrode, wherein the lead assembly does not

directly contact the patient's heart or reside in the  
intrathorasic blood vessels;

5 a capacitor subsystem located within the housing and  
electrically coupled to the electrically conductive surface  
and the electrode for storing anti-bradycardia pacing  
energy and for delivering the anti-bradycardia pacing  
energy to the patient's heart through the electrically  
conductive surface and the electrode; and

10 a battery subsystem electrically coupled to the  
capacitor subsystem for providing the anti-bradycardia  
pacing energy to the capacitor subsystem.

15 54. The implantable cardioverter-defibrillator of  
claim 53, wherein the anti-bradycardia pacing energy  
comprises a biphasic waveform having a peak voltage that is  
approximately 5 volts to approximately 500 volts.

20 55. The implantable cardioverter-defibrillator of  
claim 54, wherein the anti-bradycardia pacing energy  
comprises a biphasic waveform having a peak voltage that is  
approximately 5 volts to approximately 25 volts.

56. The implantable cardioverter-defibrillator of  
claim 54, wherein the anti-bradycardia pacing energy

comprises a biphasic waveform having a peak voltage that is approximately 25 volts to approximately 50 volts.

57. The implantable cardioverter-defibrillator of  
5 claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 50 volts to approximately 75 volts.

10 58. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 75 volts to approximately 100 volts.

15 59. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 100 volts to approximately 150 volts.

20 60. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 150 volts to approximately 200 volts.

61. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 200 volts to approximately 250 volts.

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62. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 250 volts to approximately 300 volts.

63. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 300 volts to approximately 350 volts.

64. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 350 volts to approximately 400 volts.

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65. The implantable cardioverter-defibrillator of claim 54, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 400 volts to approximately 450 volts.

5 66. The implantable cardioverter-defibrillator of  
claim 54, wherein the anti-bradycardia pacing energy  
comprises a biphasic waveform having a peak voltage that is  
approximately 450 volts to approximately 500 volts.

10 67. The implantable cardioverter-defibrillator of  
claim 53, wherein the anti-bradycardia pacing energy  
comprises a biphasic waveform having a pulse width that is  
approximately 2 milliseconds to approximately 40  
milliseconds.

15 68. The implantable cardioverter-defibrillator of  
claim 67, wherein the anti-bradycardia pacing energy  
comprises a biphasic waveform having a pulse width that is  
approximately 2 milliseconds to approximately 10  
milliseconds.

20 69. The implantable cardioverter-defibrillator of  
claim 67, wherein the anti-bradycardia pacing energy  
comprises a biphasic waveform having a pulse width that is  
approximately 10 milliseconds to approximately 20  
milliseconds.



70. The implantable cardioverter-defibrillator of  
claim 67, wherein the anti-bradycardia pacing energy  
comprises a biphasic waveform having a pulse width that is  
approximately 20 milliseconds to approximately 30  
5 milliseconds.

71. The implantable cardioverter-defibrillator of  
claim 67, wherein the anti-bradycardia pacing energy  
comprises a biphasic waveform having a pulse width that is  
approximately 30 milliseconds to approximately 40  
10 milliseconds.

72. The implantable cardioverter-defibrillator of  
claim 53, wherein the anti-bradycardia pacing energy  
comprises a biphasic waveform further comprising a positive  
15 voltage portion and a negative voltage portion.

73. The implantable cardioverter-defibrillator of  
claim 72, wherein the positive voltage portion further  
20 comprises a tilt that is approximately 10% to approximately  
90%.

74. The implantable cardioverter-defibrillator of  
claim 73, wherein the tilt is approximately 50%.

75. The implantable cardioverter-defibrillator of claim 72, wherein the negative voltage portion further comprises a tilt of approximately 10% to approximately 90%.

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76. The implantable cardioverter-defibrillator of claim 75, wherein the tilt is approximately 50%.

77. The implantable cardioverter-defibrillator of claim 53, wherein the anti-bradycardia pacing energy comprises a biphasic waveform that is provided at a rate of approximately 40 to approximately 120 stimuli/minute.

78. The implantable cardioverter-defibrillator of claim 77, wherein the biphasic waveform is provided after a patient's heart rate is equal or less than approximately 20 beats/minute.

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79. A method for supplying power for an implantable cardioverter-defibrillator for subcutaneous positioning between the third rib and the twelfth rib and using a lead system that does not directly contact a patient's heart or reside in the intrathorasic blood vessels and for providing anti-bradycardia pacing energy to the heart, the method comprising:

generating anti-bradycardia pacing energy;  
storing the anti-bradycardia pacing energy; and  
delivering the anti-bradycardia pacing energy to the patient's heart.

80. The method of claim 79, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 500 volts.

81. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 5 volts to approximately 25 volts.

82. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform

having a peak voltage that is approximately 25 volts to  
approximately 50 volts.

83. The method of claim 80, wherein the anti-  
5 bradycardia pacing energy comprises a biphasic waveform  
having a peak voltage that is approximately 50 volts to  
approximately 75 volts.

84. The method of claim 80, wherein the anti-  
10 bradycardia pacing energy comprises a biphasic waveform  
having a peak voltage that is approximately 75 volts to  
approximately 100 volts.

85. The method of claim 80, wherein the anti-  
15 bradycardia pacing energy comprises a biphasic waveform  
having a peak voltage that is approximately 100 volts to  
approximately 150 volts.

86. The method of claim 80, wherein the anti-  
20 bradycardia pacing energy comprises a biphasic waveform  
having a peak voltage that is approximately 150 volts to  
approximately 200 volts.

87. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 200 volts to approximately 250 volts.

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88. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 250 volts to approximately 300 volts.

89. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 300 volts to approximately 350 volts.

90. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 350 volts to approximately 400 volts.

91. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 400 volts to approximately 450 volts.

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92. The method of claim 80, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a peak voltage that is approximately 450 volts to approximately 500 volts.

93. The method of claim 70, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 2 milliseconds to approximately 40 milliseconds.

94. The method of claim 93, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 2 milliseconds to approximately 10 milliseconds.

95. The method of claim 93, wherein the anti-bradycardia pacing energy comprises a biphasic waveform having a pulse width that is approximately 10 milliseconds to approximately 20 milliseconds.

96. The method of claim 93, wherein the anti-bradycardia pacing energy comprises a biphasic waveform

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having a pulse width that is approximately 20 milliseconds  
to approximately 30 milliseconds.

5 97. The method of claim 93, wherein the anti-  
bradycardia pacing energy comprises a biphasic waveform  
having a pulse width that is approximately 30 milliseconds  
to approximately 40 milliseconds.

10 98. The method of claim 79, wherein the anti-  
bradycardia pacing energy comprises a biphasic waveform  
further comprising a positive voltage portion and a  
negative voltage portion.

15 99. The method of claim 98, wherein the positive  
voltage portion further comprises a tilt of approximately  
10% to approximately 90%.

100. The method of claim 99, wherein the tilt is  
approximately 50%.

20 101. The method of claim 98, wherein the negative  
voltage portion further comprises a tilt of approximately  
10% to approximately 90%.

102. The method of claim 101, wherein the tilt is  
approximately 50%.

103. The method of claim 79, wherein the anti-  
5 bradycardia pacing energy comprises a biphasic waveform  
that is provided at a rate of approximately 40 to  
approximately 120 stimuli/minute.

104. The method of claim 103, wherein the biphasic  
10 waveform is provided after a patient's heart rate is equal  
or less than approximately 20 beats/minute.

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